Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) An integrated optics encryption device comprising:

a wave guide having an input, a first optical path with a controllable refractive index, a second optical path with a controllable refractive index, and an output ~~and a contractable refractive index~~;

a coherent light source connected to the input of the wave guide;

a message signed source connected to the wave guide for controlling the refractive index of the first optical path; and

a key signal source connected to the wave guide for controlling the refractive index of the second optical path;

whereby an encrypted message appears at the output of the wave guide ~~based on a message signal input and key signal input~~, the encrypted message comprising light split from the coherent light source that passed through the first optical path combined with light split from the coherent light source that passed through the second optical path.

2. (Original) The integrated optics encryption device of Claim 1 where the wave guide produces "exclusive or" functionality based on the message signal input and the key signal input.

3. (Original) The integrated optics encryption device of Claim 1 where the coherent light source is a laser diode.

4. (Original) The integrated optics encryption device of Claim 1 where the wave guide further comprises an encrypted message signal output.

5. (Previously Presented) An integrated optics encryption device comprising:

a multi-functional integrated optics chip having an input, an output, a message signal input, and a key signal input, and

a coherent light source connected to the input of the integrated optics chip.

6. (Original) The integrated optics encryption device of Claim 5 where the multi-functional integrated optics chip comprises at least two divergent paths, each path comprising an end.

7. (Original) The integrated optics encryption device of Claim 6 further comprising a loop connected to the multi-functional integrated optics chip at the end of each path.

8. (Original) The integrated optics encryption device of Claim 6 wherein each end is mirrored.

9. (Original) The integrated optics encryption device of Claim 5 where the multi-functional integrated optics chip comprises two divergent paths meeting at a convergent end.

10. (Original) The integrated optics encryption device of Claim 5 where at least one signal generating means is connected to the message signal input and at least one signal generating means is connected to the key signal input.

11. (Original) The integrated optics encryption device of Claim 5 where the multi-functional integrated optics chip further comprises an encrypted message output.

12. (Original) The integrated optics encryption device of Claim 6 where the message signal input is connected to one path and can reversibly alter the refractive index of the path to which it is connected and the key signal input is connected to one path and can reversibly alter the refractive index of the path to which it is connected.

13. (Previously Presented) An integrated optics encryption device comprising:

a multi-functional integrated optics chip, having an input, an output, a message signal input, a key signal input, and two divergent paths with mirrored ends;

a signal generating means connected to the message signal input;

a signal generating means connected to the key signal input; and

a coherent light source connected to the input of the multi-functional integrated optics chip;

whereby an encrypted message appears at the output based on the message signal input and key signal input.

14. (Original) The integrated optics encryption device of Claim 13 where the message signal input is connected to one path and can reversibly alter the refractive index of the path to which it is connected and the key signal input is connected to the other path and can reversibly alter the refractive index of the path to which it is connected.

15. (Original) The integrated optics encryption device of Claim 13 where at least one signal generating means connected to the key signal input is a random number generator.

16. (Original) The integrated optics encryption device of Claim 13 where the coherent light source is a laser.

17. (Original) The integrated optics encryption device of Claim 13 where the coherent light source is a laser diode.

18. (Previously Presented) An integrated optics encryption device comprising:

a multi-functional integrated optics chip having an input, a message signal input, a key signal input, and an encrypted message output;

means for generating a coherent light signal connected to the input of the optics chip; and

means for producing "exclusive or" functionality based on the message signal input and the key signal input.

19. (Original) The integrated optics encryption device of Claim 18 further comprising at least one signal generating means connected to the message signal input and at least one signal generating means connected to the key signal input and where the means for producing "exclusive or" functionality based on the message signal input and the key signal input comprises means for dividing the coherent light signal into two divergent paths with mirrored ends and means for altering a refractive index of the paths.

20. (Original) The integrated optics encryption device of Claim 18 wherein the message signal input further comprises means for reversibly altering a refractive index of one path and wherein the key signal input further comprises means for reversibly altering a refractive index of another path.

21. (Original) The integrated optics encryption device of Claim 19 wherein at least one signal generating means connected to the key signal input is a random number generator.

22. (Original) A method for encryption using interference from a coherent light source comprising the steps of:

issuing a coherent light signal from a coherent light source to a multi-functional integrated optics chip;

dividing the coherent light signal into two paths within the multi-functional integrated optics chip;

issuing pre-determined signals to the two paths of the multi-functional integrated optic chip where a message signal input is attached to one path of the multi-functional integrated optics chip and a key signal input is attached to the other path;

recombining the divided light signal to create an encrypted signal; and,

outputting the encrypted signal via an encrypted message output.

23. (Original) The method of claim 22 where the message signal input and key signal input reversibly alter the refractive index of the path to which each input is connected.

24. (Original) The method of Claim 22 where the key signal input is connected to a random number generator.

25. (Original) The method of Claim 22 where each path has a mirrored end.

26. (Original) A method for decryption using interference from a coherent light source comprising the steps of:

issuing a coherent light signal from a coherent light source to a multi-functional integrated optics chip;

dividing the coherent light signal into two paths within the multi-functional integrated optics chip;

issuing pre-determined signals to the two paths of the multi-functional integrated optic chip where an encrypted message signal input is attached to one path of the multi-functional integrated optics chip and a key signal input is attached to the other path;

recombining the divided light signal to create a message signal; and,

outputting the message signal via a message signal output.

27. (New) An apparatus that produces an optical signal encoded with an encrypted message by splitting coherent light into a first optical signal and a second optical signal, encoding the first optical signal with a message to be encrypted, encoding the second optical signal with a key, and combining the first and second optical signals to produce the optical signal encoded with an encrypted message.

28. (New) The apparatus of claim 1 wherein the apparatus encodes the first and second optical signals by controlling the flow of light through two separate waveguides by controlling the refractive index of each of the two separate waveguides.

29. (New) An apparatus comprising:

an optical waveguide input;

a first optical path having a variable refractive index related to the voltage of a message input;

a second optical path having a variable refractive index related to the voltage of a key input; and

an optical waveguide output;

wherein the optical wave guide input, the first optical path, the second optical path, and optical waveguide output are optically coupled together such that light entering the apparatus via the optical waveguide input is split such that a first portion of the light follows the first optical path and a second portion of the light follows the second optical path, and any of the first portion of the light that passes through the first optical path is combined with any of the second portion of light that passes through the second optical path and exits the apparatus via the optical waveguide output.